

BELL LABORATORIES RECORD

INDEX

Volume 35
January 1957 to December 1957

Bell Laboratories Record

Editor

GEORGE E. SCHINDLER, JR.

Assistant Editors

W. W. MINES

A. G. TRESSLER

A. B. HILTON

Production Editor

R. LINSLEY SHEPHERD

Circulation Manager

THEODORE N. POPE

BELL TELEPHONE LABORATORIES, INCORPORATED
463 West Street, New York 14, N. Y.

LIST OF ISSUES IN VOLUME 35

No.	1	January	Pages	1- 40
"	2	February		41- 80
"	3	March		81-120
"	4	April		121-160
"	5	May		161-200
"	6	June		201-240
"	7	July		241-280
"	8	August		281-320
"	9	September		321-360
"	10	October		401-440
"	11	November		441-480
"	12	December		481-520

Index to Authors, Subjects and Titles, Volume 35

A

- A1 DIGITAL DATA SIGNALING SYSTEM *See* Digital Data Signaling System
- A2A VIDEO TRANSMISSION SYSTEM *See* Transmission: television
- AF *See* United States Air Force
- AMA *See* Automatic Message Accounting
- APS *See* American Physical Society
- AT *See* Automatic Ticketing
- A.T.&T. *See* American Telephone and Telegraph Company
- ABERDEEN 41
- ACADEMY OF TELEVISION ARTS AND SCIENCES
Bell System Science Series award 183
- ACCOUNTING *See* Automatic Message Accounting; Automatic Ticketing
- ACOUSTICAL SOCIETY OF AMERICA
Gold Medal
Fletcher, H. 358
Los Angeles meeting, November 1956
talks, by members of the Laboratories 277
New York City meeting
talks, by members of the Laboratories 277
- ACOUSTICS RESEARCH
voice-actuated machines 281-86
- Adhesion of Solids: Principles and Applications* (O. L. Anderson) 441-45
- AERIAL TENT
C-ladder, development 104
- AERODYNAMICS, digital computers and 81
- Affel, H. A. 196; *illus* 76
- AIR FORCE. *See* United States Air Force
- Air-Ground Circuit for Airlines* (N. Monk) 326-30
- AIR UNIVERSITY
Board of Governors
Kelly, Mervin J. 317
- AIRLINES
mobile air telephone service 326-30, 471
- ALASKA
"White Alice" network 21
- ALASKAN TELEPHONE CABLE
description 14
service begun 14
- ALBANY, NEW YORK 42
- Albert J. Myer* (cable ship) 14
- Alford, E. L.
One-Man Aerial Tent 104
- Alexander, B. D. *illus* 410
- Algeri, M. *illus* 268
- ALLENTOWN PLANT (WESTERN' ELECTRIC) 47, 307
- Alling, Vivian J. *illus* 83
- ALLOY
aluminum, extrusion 164
lead, extrusion 164
mechanical properties 164
solder 163
strides in 250
See also Supermendur
- ALUMINUM
alloy, extrusion 164
Bell System consumption, 1956 161
cable sheath 163-64
- AMA Assembler-Computer (T. C. Rehm) 423-27
- Ambrose, John F. *illus* 250
biographical material 250
Pigments in Polymer Materials 246-50
- AMERICAN CERAMIC SOCIETY
Dallas meeting
BTL personnel participating 236
talks, by members of the Laboratories 277
glass division, Anderson, O. L., chairman 437
- AMERICAN CHEMICAL SOCIETY
Miami meeting
talks, by members of the Laboratories 237
- AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
Laboratories personnel active, 1957-1958 427
Winter General Meeting 76-77
talks, by members of the Laboratories 117
- AMERICAN PHYSICAL SOCIETY
Chicago meeting, November 1956
talks, by members of the Laboratories 39
Kelly, Mervin J., address 110-11
New York City meeting
talks, by members of the Laboratories 117
Philadelphia meeting
talks, by members of the Laboratories 198
Washington, D. C. meeting
talks, by members of the Laboratories 237
- AMERICAN SOCIETY FOR TESTING MATERIALS
Sam Tour Award
Compton, K. G. 358
Mendizza, A. 358
- AMERICAN SOCIETY OF CIVIL ENGINEERS
Karl Emil Hilgard Prize
Ross, D. 437
- AMERICAN STANDARDS ASSOCIATION
Townsend, J. R., medal 516
- AMERICAN TELEPHONE AND TELEGRAPH COMPANY 41
annual meeting
Kappel, F. R., address 232-33
Annual Report, 1956 112-14
construction, 1956 112
earnings, 1956 112
financing, 1956 112
Long Lines Department, *see* Long Lines Department
- AMERICUS, GEORGIA
tone ringer field trial 51-52
- AMPLIFIER
153A, phototransistor
switchboards, blind personnel operation 30-31
microwave, ferrite 316-17; *illus*
packaged, test set, field 61-64
transistor 94
traveling-wave, description 242

- AMSTERDAM
Transatlantic Telephone Cable 41
- ANCHORAGE, ALASKA 14
- Anderson, Carl D. 437
- Anderson, O. L. *illus* 336, 443, 445
Adhesion of Solids: Principles and Applications 441-45
American Ceramic Society, Glass Division chairman 437
biographical material 445
- Anderson, R. R. *illus* 323
- Andre, Florian J.
Western Electric director 156
- Andreatch, P., Jr. *illus* 234, 336, 443
delay line, torsional wave 234
- Andrews, E. G. *illus* 81, 84
Bell Laboratories Digital Computers 81-84
biographical material 84
- ANSWERING SERVICES
switchboards
557A 6-9
557B 6-9
- ANTENNA
parabolic, DEW Line 450-53
- Arlt, Herbert G.
biographical material 156
Standards Engineers Society president 156
- ARMATURE
relay
wire-spring multicontact, rebound 133
- ARMED FORCES WORK *See* Military Communications
- Arnold, Harold B. 196
- Arnold, S. M. *illus* 29
- Arnold, William 195
- ARTIFICIAL MOON *See* Earth Satellite
- ATLANTIC TELEPHONE CABLE *See* Transatlantic Telephone Cable
- ATMOSPHERE
wave, millimeter, transmission 494-97
- ATOMS FOR PEACE AWARDS, INC.
Kelly, Mervin J., committee 358
- ATOMIC ENERGY, peaceful applications 110-11
- ATOMICS, digital computers 81
- ATTENUATOR, microwave 418
- AUDIO ENGINEERING SOCIETY
Mason, W. P., award 453
Nyquist, H., award 453
Sawyer, Carleton R., award 453
Wente, E. C., award 453
- AUDIO TRANSFORMER *See* Transformer
- "AUDION TUBE" *See* Electron Tube
- AUDREY (Automatic Digit Recognizer) 284
Automatic Calculation of Transmission Deviations (R. C. Nance) 503-07
- AUTOMATIC DIGIT RECOGNIZER *See* Audrey
- AUTOMATIC MESSAGE ACCOUNTING
assembler-computer 423-27
Automatic Ticketing, conversion from 184-87, 261
centralized
crossbar systems, step-by-step 312-14
positions, remote 353-56
crossbar systems 89
1-type 90
5-type 90
operation 251
printer-comparer-scanner 512-15
- relays 162
step-by-step, maintenance 261-63
tape *illus* 90
- Automatic Message Accounting Centers in 1957* (G. Riggs) 251
- AUTOMATIC TICKETING
automatic message accounting, conversion to 184-87, 261
block diagram 90
ticket *illus* 90
- AUTOMATION
relays 216
transformers
audio, carrier, P-type 216
- Averbach, E. *illus* 483
- Avery, R. C. *illus* 141
biographical material 141
Division of Telephone Numbers in the No. 5 Crossbar System 139-42
- AYLETT, VIRGINIA, radio relay route 167
- AZORES CABLE *See* New York-Azores Cable
- B**
- BOD TEST *See* Test: biochemical oxygen demand
- BWO *See* Oscillator: backward-wave
- BSTJ *See* Bell System Technical Journal
- BACKWARD-WAVE OSCILLATOR *See* Oscillator
- Bacom, W. L. *illus* 27
- Baird, J. A. 146; *illus* 272
- Baker, Bill R. 196
- Baker, W. O. *illus* 516
Washington College honorary degree 516
- BAKER AWARD (Institute of Radio Engineers)
Fewer, D. R. 56
Kircher, R. J. 56
Trent, R. L. 56
- Balde, J. W. *illus* 61, 64
biographical material 64
Field Test for "Packaged" Amplifiers 61-64
- Baldinger, W. R. *illus* 187
biographical material 187
Converting Automatic Ticketing to Automatic Message Accounting 184-87
- Baldwin, M. W., Jr. *illus* 484
biographical material 484
Simulating Sharpness in Color Television 481-84
- BALLISTICS, digital computers in 81
- Barbieri, F. *illus* 428
Improved Way to Cut Cylindrical Crystals 428-29
- Bardeen, J. 196, 235; *illus* 33
Nobel Prize in Physics, 1956 32-33
- BARNACLE *illus* 289
- BAR-TYPE CONTACT *See* Contact
- Basic Modulation Unit for Military Carrier Systems* (A. E. Peterson) 188-91
- Basil O. Lenoir* (cable ship) 250
- BATTERY, solar, *see* Bell Solar Battery
- Baxter, Frank 60; *illus* 120, 436
- Beach, A. L. *illus* 36
- Bedell, E. H. 115
- Bell, Alexander Graham 42
- Bell Laboratories Digital Computers* (E. G. Andrews) 81-84
- BELL LABORATORIES RECORD
editorial board, *see* inside frontcover

- editorial staff, *see* inside frontcover
 Schindler, G. E., Jr., editor 138
- BELL SOLAR BATTERY**, power supply 21
- BELL SYSTEM**
 engineers 77
 metal consumption statistics 161-62
 repeaters, facts and figures 227-30
 service goal 201
 telephone, 50-millionth 156
 television services 85; *map* 157
- Bell System Aid to the Blind* (S. B. Weinberg) 30-31
- BELL SYSTEM SCIENCE SERIES**
 awards 183
Hemo the Magnificent 60, 120
 objectives 60
 plans 437
 purpose 120
 rebroadcasts 515
Strange Case of the Cosmic Rays 436-37
- BELL SYSTEM TECHNICAL JOURNAL**
 Bulloch, W. D., editor 138
 contents
 November, 1956 37
 January, 1957 64
 March, 1957 156
 May, 1957 274
 July, 1957 317
 September, 1957 516
- BELL TELEPHONE LABORATORIES** 76, 112-13
 A.I.E.E. activities, 1957-1958 427
 Alaskan Telephone Cable work 14
 college tuition aid plan 142
 DEW Line work 18
 graduate study center 235
 Metallurgy Research Department, *see* Metallurgy Research Department
 military communications, *see* Military Communications
 submarine cables 206-11
 television research 150
 United States Information Agency Certificate of Merit 197
 "White Alice" 21
See also names of specific sites of laboratories, e.g., Murray Hill Laboratory
- Bello, Phillip A. 196
- Berg, Barbara *illus* 448
- Bergmann, H. J. *illus* 471
- BERNE, and Transatlantic Telephone Cable 41
- Berry, E. *illus* 5
- Best, G. L. *illus* 455
- BILLING** *See* Automatic Message Accounting; Automatic Ticketing
- BIOCHEMICAL OXYGEN DEMAND TEST** *See* Test
- BISCAY, Bay of 42
- Bishop, W. M. 209
- Biskeborn, M. C. *illus* 76, 311
 biographical material 311
Capacitance Monitor for Plastic Insulated Wires 308-11
- Bitter, Francis 175
- Black, H. S., biographical material 52
- BLACK** *See* Carbon Black
- Bleeding of Oil-Type Preservatives* (J. Leutritz) 252-55
- BLIND PERSONNEL**
 PBX operation phototransistor aid 30-31
- Bloembergen, N. 109
- BLOOD, circulation 120
- BOARD** *See* Switchboard
- Boardman, E. M. 209
- Bobeck, A. H. *illus* 488
 twistor 488-89
- Bode, H. W. 209
 biographical material 215
 National Academy of Sciences, member 215
- Bodle, D. W. *illus* 511
 biographical material 511
Lightning Protection of TD-2 Stations 509-11
- Bond, W. L. *illus* 5
 biographical material 5
Depth of Diffused Layers 1-5
- BONDING**
 semiconductors, thermo-compression 336, 443-45
- Booth, R. P. 21
- BORER(s), marine 287-92
- Bouton, G. M. 461
- Boyd, Betty *illus* 339
- Boyet, H. *illus* 460
 biographical material 460
Field Displacement Isolator in Microwave Communications 456-61
- Boyle, W. S. *illus* 508
- Bowie, D. F. 76
- Bowles, E. A. 155
- Bown, Ralph
 Bell System Science Series 183
- Braga, F. J. *illus* 76
- Brattain, W. H. 235; *illus* 33, 315
 Achievement Award 358
 ceremonies of Nobel Prize described 116-17
 Minnesota University honorary degree 315
 Nobel Prize in Physics, 1956 32-33
 diploma *illus* 116
- Bridges, William B. 196
- Bridgman, Percy W. 52
- Brillhart, S. E. 273
- BRITISH GENERAL POST OFFICE** 41, 76
Broad-Band Microwave Circulator (E. A. Ohm) 293-97
- Brockbank, R. A. 76
- Bronstein, N. *illus* 412
 semiconductor diode converter 412
- BRONZE**
 phosphor, fatigue properties 162
- Brosio, Manlio 36
- Brown, W. L. *illus* 437
- Brown, W. W. *illus* 222
 biographical material 222
Chairs for Telephone Operators 219-22
- BRUSSELS**
 Transatlantic Telephone Cable 41
- Buckley, O. E. 42-43
 transatlantic telephone cable 206-09
- Budlong, A. H. *illus* 446
- Buehler, Ernst *illus* 342
- Bulloch, William D. 197
 BSTJ editor, appointment 138
 biographical material 138
- Bush, Vannevar 52, 196
- C**
- C LADDER TENT** *See* Aerial Tent
- C-TYPE CARRIER** *See* Carrier

CABLE

- Alaskan telephone, *see* Alaskan Telephone Cable
- carrier, *see* Carrier
- Catalina Island, *see* Catalina Island Cable
- Key West-Havana, *see* Key West-Havana Telephone Cable
- N-carrier
 - radio interference, suppression 100-03
 - static, suppression 100-03
- New York-Azores, *see* New York-Azores Cable
- "spiral four"
 - carrier, military 72-75
 - carrier equipment 223
- splicing
 - pneumatic 499-501
 - sleeves, punched 276
- submarine, *see* Submarine Cable
- transatlantic telephone, *see* Transatlantic Telephone Cable

CABLE PLANT, cost 168

Cable Splicing Goes Modern (W. C. Kleinfelder) 499-501

Calbick, C. J. *illus* 29

Calvin, Melvin 195

CAMA for Step-by-Step Areas (E. Goldstein) 312-14

Campbell, M. E. *illus* 259

biographical material 259

Transatlantic Submarine Cable Design 256-60

CANADIAN OVERSEAS TELECOMMUNICATION CORPORATION 41, 76

CAPABILITY REQUIREMENTS, defined 65

Capacitance Monitor for Plastic Insulated Wires (M. C. Biskeborn, R. A. Kempf) 308-11

CAPACITOR

solid electrolytic, tantalum, miniaturized 419-22

Capra, Frank 60, 120

CARBON BLACK

cable sheath, polyethylene 247

pigments, *electron micrographs* 247

CARCINOTRON *See* Oscillator: backward-wave

CARD(s)

translator

coding tool 53-56

illus 53, 54, 55

Carlson, Richard 60; *illus* 120

Carmichael, Leonard *illus* 154

Caroselli, R. J. *illus* 333

Carpenter, Warren G. *illus* 472

biographical material 472

Franklin Institute medal 472

CARRIER

C-type, submarine cables 207

design 179-90

K-type

frequencies 101

submarine cables 207

L3, television terminals 179-83

military

distortion 73

4-channel

equalization 72-75

repeater 223-26

terminal 223-26

12-channel

equalization 72-75

maintenance 264-67

order circuit 264-67

modulation unit

TA-219/U 188-91

modulation 179-80

N-type

air-ground telephone service 326-30

radio interference, suppression 100-03

static, suppression 100-03

transformer, audio, *illus* 218

N1

transformers, carrier-frequency 69

P-type

transformers, audio, miniature 216-18

P1

development 143

equipment features 143-46

miniaturization 69

power supplies 19-21

printed circuitry 143

tone ringer field trial 51-52

transformers, carrier-frequency 69-71

transistors 143

Carrier-Frequency Transformers for P1 Carrier (Doris Ribett) 69-71

Carson, J. R. 206

CATALINA ISLAND CABLE 43, 206

CENTER *See* Wire Center

CENTRAL OFFICE

contact, relay, life 65-68

crossbar

5-type

dialing, direct distance 212-15

investment 168

panel-type

dialing, direct distance 212-15

dial

355A, line-finder units 105-08

electronic, digital computers 84

step-by-step

automatic message accounting

block diagram 91

automatic ticketing, block diagram 90

Certain Properties of Ferrites (J. K. Galt) 126-30

Chairs for Telephone Operators (W. W. Brown) 219-22

Chang, Hsu 196

Chapin, Daryl M. *illus* 196

John Scott Medal 196

CHARLOTTE ORDNANCE MISSILE PLANT

Nike Hercules 147

CHESAPEAKE AND POTOMAC TELEPHONE COMPANIES

Smithsonian Institution exhibit 154-55

CHICAGO, ILLINOIS

dial telephone

"drive-in"

field trial 231

CHICAGO, University

Fermi professorship, proposed 36

Chilson, Hatfield 14

CHLOROPLAST(s)

semiconducting properties 195

Christensen, H. *illus* 336, 443

Cindric, G. T. *illus* 323

CIRCUIT *See* subhead Circuit under names of equipment and apparatus, e.g., Tone Ringer: circuit; *also see* Printed Circuitry

CIRCULATOR

microwave

broad-band 293-97

ideal *illus* 294

- Cisler, Walter L. 36
- CLAPP, WILLIAM F., LABORATORIES 287-92
- CLARENVILLE, NEWFOUNDLAND 41
- Clausen, R. W. *illus* 87
- CLEANING, semiconductor components 337
- Closson, H. T. *illus* 498
- Clow, A. P.
Vice President, Western Electric 273
- COATING
conductive 331-35
resistive 331-35
- COAXIAL CARRIER *See* Carrier
- COBALT, crystal structure 177-78
- COBALT FERRITE, magnetostriction 127
- Coding Tool for Translator Cards* (E. Graf) 53-56
- COLLEGE TUITION AID PLAN 142
- COLOR TELEVISION *See* Television
- Collins, C. A. *illus* 13
biographical material 14
Switching Control at Television Operating Centers 10-14
- COLUMBUS PLANT (WESTERN ELECTRIC)
BTL branch planned 358
- COMMUNICATION(s)
digital computers 81-84
military, *see* Military Communications
- COMMUNICATIONS DEVELOPMENT TRAINING PROGRAM
Digital Techniques Laboratory 146
graduation, 1957 317
NYU graduate center 429, 449
- COMPANDOR, transatlantic telephone cable 46
- COMPANY(ies) *See* Operating Companies
- Compton, K. G.
A.S.T.M. Sam Tour Award 358
- COMPUTER
Gunnery System Simulator 94-99
See also Digital Computers
- CONCENTRATOR
line
remote, crossbar systems, 5-type 168-74
theory 168-70
- Conductive and Resistive Coatings* (R. J. Phair), 331-35
- CONDUCTIVITY
metals 162
thermal, metals 162
- CONDUCTIVITY LAYERS
crystal, diffusion 1-5
- CONDUCTOR(s)
telephone cords 23-24
- CONNECTION
solderless wrapped, relaxation 205
- CONTACT
bar-type *illus* 66
chatter, wire-spring relays 133
contamination history *graph* 27
performance dust 25-28
palladium, life 67
point- and disc *illus* 66
relay
central offices
life 65-68
reliability 65
current loads 65
dust 25-28
erosion 65
welding at 508
silver
- capability tests 67
life 67
single, reliability 26
twin, reliability 26
- Conversion of Automatic Ticketing to AMA* (A. S. Martins) 89-93
- Converting Automatic Ticketing to Automatic Message Accounting* (W. R. Baldinger) 184-87
- Cook, M. H.
Sigma Tau Vice President, election 78
- Coover, M. S. *illus* 76
- COPENHAGEN
Transatlantic Telephone Cable 41
- COPPER
Bell System consumption, 1956 161
- CORDOVA, ALASKA 21
- CORE, ferrites 166
- CORNELL UNIVERSITY 197
- CORPUS CHRISTI, TEXAS 183
- CORROSION
metals, defined 201
- COST
cable plant 168
central office, 5-type 168
concentrator, line, remote 169
relays 230
- Cournaud, Andre
Nobel Prize in Medicine, 1956 33
- Craig, Cleo F. 41, 43; *illus* 211
A.T.&T. Board of Directors, Chairman retirement 211
biographical material 211
management, tomorrow's 193
- Crawford, A. B. *illus* 496, 497
biographical material 497
Propagation of Millimeter Waves through the Atmosphere 494-97
- Crawford, R. V. *illus* 471
- CREEP
metals 162-63, 201-05
temperature 201
sheath, cable 204
- CREOSOTE, bleeding 252-55
- CROSSBAR SYSTEMS
1-type
automatic message accounting 90
dialing, direct distance 212-15
4A toll, card translator 53
5-type
automatic message accounting 90
concentrator, line, remote 168-74
dialing, direct distance 212-15
flexibility 139
intermarker group operation 431-34
life expectancy 65
relays, life requirements *graph* 228
switching *block diagram* 229
telephone numbers, divisions 139-42
automatic message accounting 89
Columbus plant (Western Electric) 157
holding time 131
panel, dialing, direct distance 212-15
production 105
step-by-step
CAMA for 312-14
line-insulation testing 473-76
switching, *block diagram* 229
See also Private Branch Exchange

Crutchfield, F. L. *illus* 52
biographical material 52
Tone Ringer 48-52

CRYSTAL

cobalt, structure 177-78
data subset 123
semiconductor
conductivity layers, measurement 1-5
structure, ferrites *illus* 128

CRYSTAL LAKE, ILLINOIS

tone ringer field trial 52

CULVER CITY, CALIFORNIA 89, 93

Curie, Marie 196

CURIE POINT, of ferrite 126, 128

D

DEW LINE See Distant Early Warning Line

DDD See Dial Telephone: direct distance

DTL See Digital Techniques Laboratory

Daly, Miss M. R. *illus* 243, 244

Darnell, P. S. 115

DATA SUBSET 121-25

DATA TRANSMISSION

high-speed 121-25
block diagram 122
"recorded carrier" system 321-25
SAGE service 401-05

David, E. E., Jr. *illus* frontcover Aug. 285
biographical material 285

Voice-Actuated Machines: Problems and Possibilities
281-86

DAYTONA BEACH, FLORIDA 288-92

DEFENSE SCIENCE BOARD

Kelly, Mervin J., member 437

DEFENSE WORK See Military communications

DEFOCUSING PROJECTOR 481-84

de Forest, Lee 37 *illus*; 196

DEFORMATION

germanium 165
silicon 165

DELAY LINE

wave, torsional 234

Depew, C. 208

Depth of Diffused Layers (W. L. Bond) 1-5

DESK(s), and chairs 219-22

Desmond, R. A. *illus* 494, 495

Dial Testing Equipment (F. West) 15-18

DIAL TELEPHONE, DIALING

answering services, see Answering Services

cable, see Cable

carrier, see Carrier

central office, see Central Office

cords, see Telephone Cords

crossbar systems, see Crossbar Systems

direct distance

connecting circuits 299-303

crossbar systems

1-type 212-15

panel-type 212-15

deviations, calculation 503-07

expansion 105, 303

switching centers 53

distortion, see Distortion

"drive-in" 231; *illus*

equalization, see Equalization

50-millionth 156

operators, see Telephone Operators

picture, see Picture-Phone

poles, see Telephone Poles

repeater, see Repeater

research 112-13

ringing, see Ringing

rural service, see Rural Telephone Service

set, see Telephone Set

Strowger system 227

switchboard, see Switchboard

switching, see Switching

telephone companies, see Operating Companies

telephone cords, see Telephone Cords

telephone poles, see Telephone Poles

telephone set, see Telephone Set

terminal, see Terminal

transmission, see Transmission

trunks, see Trunk

DIAMOND

elastic moduli, measurement, ultrasonic 275-76

Dienel, H. F. *illus* 307

biographical material 307

Semi-Automatic Test Set for Varistors 304-07

Dietzold, R. L., 146, 196

DIFFUSION

conductivity layers

crystals 1

DIGITAL COMPUTERS 81-84

V model *illus* 83

VI model *illus* 82

applications 81

capacities 81

central office, electronic 84

development 81-84

diodes 99

history 81

"languages" 338-41

scope 84

statistical information *table* 82

transistors 84

transistors 99

See also TRADIC

DIGITAL DATA SIGNALING SYSTEM

A1 403-05

DIGITAL DATA TRANSMISSION See Data Transmission

DIGITAL TECHNIQUES LABORATORY 146

DIODE

digital computers 99

data subset 123

semiconductor, converter gain 412

DIRECT DISTANCE DIALING See Dial Telephone

Direct Distance Dialing from Panel and No. 1 Crossbar
Offices (J. W. Kirchoff, C. O. Parks) 212-15

DISTANT EARLY WARNING LINE

antenna, parabolic 450-53

completion 435

first buildings accepted 18

history 18

sites completed 194-95; *illus*

station *illus* 435

statistics 194-95

"White Alice" reporting system 21

DISTORTION

carrier; military 73

Distinctive Ringing Signals for the 500 Set (R. T. Jenkins)
348-52

Division of Telephone Numbers in the No. 5 Crossbar Sys-
tem (R. C. Avery) 139-42

Dodge, Harold F.
 biographical material 36
 Rutgers University appointment 36
 Doherty, W. H. *illus* 195
 Assistant to President, BTL 195
 biographical material 195
 DOLLIS HILL (research station) 43
 Douglas, James H. *illus* 357
 DOUGLAS AIRCRAFT COMPANY
 Nike Hercules 147
 Dow, Daniel G. 196
 Draper, Norman R. 196
 "DRIVE-IN" TELEPHONE *See* Dial Telephone
 DRY-REED SWITCH *See* Switch
 Duguid, J. M. 211
 Durand, J. *illus* 428
Improved Way to Cut Cylindrical Crystals 428-29
Dust on Relay Contacts (H. J. Keefer) 25-28

E

E13 REPEATER *See* Repeater
 E-TYPE REPEATER *See* Repeater
E-Type Repeaters: San Francisco to Oakland Circuits (W. J. Kopp) 135-38
 Eadie, T. W. 76
 EARTH SATELLITE
 transmitter, transistors, diffused-base 245
 EASTERN TELEPHONE AND TELEGRAPH COMPANY 44
 Edison, Thomas A. 196
 Edmonds, R. W. *illus* 88
 biographical material 88
Performance of the A2A Video Transmission System 85-88
Effective Patents: A Cooperative Effort (R. M. Porter) 462-65
 Ehrbar, R. D. 250
 Ekeberg, Lars Birger 33, 116
 ELASTICITY
 diamond, measurement, ultrasonic 275-76
 ELECTRIC WAVE *See* Wave
 ELECTRICAL CONDUCTIVITY *See* Conductivity
 ELECTRICAL EROSION *See* Erosion
 ELECTRICAL INDUCTION *See* Induction
 ELECTRICAL NOISE *See* Noise
 ELECTROCHEMICAL SOCIETY
 Washington, D.C. meeting
 talks, by members of the Laboratories 277
 ELECTRON BEAM
 oscillator, backward-wave 242-43
 ELECTRON TUBE
 "audion" 37
 "talking path" *illus* 35
 transatlantic telephone cable 208-09, 257
 ELECTRONIC COMPONENTS SYMPOSIUM, 1957
 talks, by members of the Laboratories 277
 ELECTRONIC SWITCHING SYSTEM *See* Switching Systems
 ELECTRONICS, and digital computers 81
 Elicker, R. E. *illus* 452
 Elmen, Gustaf W. 196
 Elmore, W. C. 175
 Emling, J. W. *illus* 76
 ENGINEER(s), three-dimensional, need for 77
 ENGINEERING FOUNDATION 201

ENGINEERING INSTITUTE OF CANADA 76
 Eno, Wilber S. *illus* 23, 24
 biographical material 24
Testing Telephone Cords 22-24
 EQUALIZATION
 carrier, military 72-75
 defined 72
Equalization of Military Carrier Telephone Systems (C. L. Semmelman) 72-75
 EQUALIZER
 transatlantic telephone cable 47
 EROSION
 contacts, relay 65-68
 Espenschied, L.
 Pratt Institute honorary degree 315
 ETHYLENE MONOMER
 model *illus* 247
 EUROPEAN SYMPOSIUM ON RADIO LINKS
 Kelly, Mervin J., address 268-69
 McDavitt, M. B., address 268-70
Evolution of the Transatlantic Cable
 (O. B. Jacobs) 206-11
Experimental "Drive-In" Coin Telephone
 (W. J. Kennedy) 231
 EXTRUSION
 aluminum alloy 164
 lead alloy 164

F

4A TOLL CROSSBAR SYSTEM *See* Crossbar Systems
 5-TYPE CROSSBAR SYSTEM *See* Crossbar Systems
 500-TYPE TELEPHONE SET *See* Telephone Set
 557A SWITCHBOARD *See* Switchboard
 557B SWITCHBOARD *See* Switchboard
 FCC *See* Federal Communications Commission
 FAIRBANKS, ALASKA 14
 Famiglietti, A. P. *illus* 314
 FARADAY ROTATION 293-97
 FASHION, and chairs 221
 FATIGUE
 metals 162, 201-05
 nickel silver 162
 phosphor bronze 162
 sheath, cable 204
 study 201
 transmission lines 203-04
Fatigue, Creep, and Relaxation in Metals (G. R. Gohn) 201-05
 Faulkner, L. W. *illus* 500
 FEDERAL COMMUNICATIONS COMMISSION
 microwave expansion 298
 Feher, George *illus* frontcover Mar, 109
 solid-state microwave oscillator,
 invention 109
 Felch, E. P. 115
 Felder, H. H. *illus* 299, 303
 biographical material 303
Improvements in Toll Connecting Circuits for Nation-wide Dialing 299-303
 Felker, J. H. 146
 FELLOWSHIP(s) *See* Laboratories
 Fellowships
 Fermi, Enrico
 Chicago University professorship, proposed 36

- FERRITE 166
 ac characteristics 126
 cobalt, *see* Cobalt Ferrite
 crystal structure *illus* 128
 Curie point 126, 128
 dc characteristics 126-27
 magnetostriction 126-27
 microwave 274, 316-17
 properties 126-30
 resistivity 127
 rotational motion *illus* 129
- FERRITE CORES 166
- FERROMAGNETIC METALS
 ac characteristics 126
 Curie point 126, 128
 dc characteristics 126-27
- Fessler, G. E. *illus* 172, 174
 biographical material 174
Remote Line Concentrator for No. 5 Crossbar 168-74
- Fewer, D. R.
 W. R. G. Baker Award 56
Field Displacement Isolator in Microwave Communications
 (H. Boyet, S. Weisbaum) 456-61
Field Test Set for "Packaged" Amplifiers (J. W. Balde)
 61-64
- FINDER *See* Line Finder
- Fine, I. M. *illus* 475
- First Transatlantic Telephone Cable System (E. T. Mottram) 41-47
- Fischer, H. B. *illus* 76
- Fisk, J. B. 215, 260, 298
- Fitzwilliam, J. W. 153
- Flaschen, S. S. 236
- Fleming, H. C. *illus* 264, 267
 biographical material 267
Twelve-Channel Military Carrier:
Order Circuit and Maintenance 264-67
- Fleming, R. V. *illus* 154
- Fletcher, Harvey
 Acoustical Society of America Gold Medal 358
 biographical material 358
- Forssman, Werner
 Nobel Prize in Medicine, 1956 33
- Foster, F. G. 177, 197; *illus* 175, 178
 biographical material 178
Magnetography: The Microscopy of Magnetism 175-78
- Foster, L. V. 177
Four-Channel Military Carrier Terminal and Repeater
 (G. E. Harper) 223-26
- FRANKFURT
 Transatlantic Telephone Cable 41
- FRANKLIN INSTITUTE
 Carpenter, W. G., award 472
 Johnson, J. B., award 472
 Pfann, W. G., award 472
- Fraser, John M. *illus* 76, 256, 259
 biographical material 259
Transatlantic Submarine Cable Design 256-60
- Fredkin, Donald R. 196
- FRICTION, metals 201
- Fuller, Calvin S. *illus* 196
 John Scott Medal 196
- FUSE
 35-type
 70-type, replacement by 108
- 70-type
 35-type, replacement of 108
- Future of Communications (F. R. Kappel) 34-35
- G**
- Galt, J. K. 29; *illus* 126, 130
 biographical material 130
Certain Properties of Ferrites 126-30
- Garrett, C. G. B. *illus* 466, 470
 biographical material 470
Transistors, Reliability, and Surfaces 466-70
- GATING
 matrix, transistor, computer, simulated warfare 94-99;
illus 96
- GENERATOR
 wave, millimeter
 oscillator, backward-wave 241-45
 wind, new 406-07
 thermoelectric 407-10
- GERMANIUM
 deformation 165
 hydrogen in 36-37
 oxygen in 36-37
 tin in 417
- Gibbons, D. F. *illus* 164
- Gibson, Daniel Z. *illus* 516
- Giddings, G. A. *illus* 491, 493
 biographical material 493
Telephone Communications for RAPCON Centers
 490-93
- Gifford, Walter S. 150
- Gilbert, J. J. 206, 210-211; *illus* 210
- Gill, Sir Archibald 76
- Gilmer, Ben S. *illus* 78
 biographical material 78
 Southern Bell Telephone Company
 President, election 78
- Githens, J. A. *illus* 272, 338, 340
- GLASGOW, SCOTLAND 41
- Glarum, Sivert H. 196
- Gleichmann, T. F. 76, 250; *illus* 76
- GLOVE(s)
 linemen's, new 192; *illus*
- Goddard, M. C. *illus* 431, 433
 biographical material 433
Intermarker Group Operation in No. 5 Crossbar 431-34
- Goetze, A. P. *illus* 65, 68, 455
 biographical material 68
Relay Contact Life in Central Offices 65-68
- Gohn, G. R. *illus* 205
 biographical material 205
Fatigue, Creep, and Relaxation in Metals 201-05
- Goldstein, E. *illus* 314
 biographical material 314
CAMA for Step-by-Step Areas 312-14
- Gorman, Florence *illus* 414
- Goudsmit, Samuel A. 52
- Gould, K. E. 196
- GRADUATE TRAINING PROGRAM
 away from New York 276
- Graf, E. *illus* 53, 56
 biographical material 56
Coding Tool for Translator Cards 53-56
- Graham, R. E. *illus* 152
- Greene, J. A.
 Ohio Bell Telephone Company Board Chairman 357

Greenwalt, Crawford H. 36
 Greenwood, Q. E. 210
 Greiner, E. S. *illus* frontcover Jan
 Griffith, R. G. 76
 Grisdale, R. O. 197
 Gronos, W. 208
 Grosvenor, Melville Bell *illus* 154
 Gryb, R. M. *illus* 321, 325
 biographical material 325
 "Recorded Carrier" System for High-Speed Data Transmission 321-25
 GUIDED MISSILES 114
 See also Nike; Nike Hercules
 test center, *see* United States Air Force Missile Test Center
 Guldner, W. G. *illus* 36
 GUNNERY SYSTEM SIMULATOR
 transistor gating 94-99
 Gustav VI Adolph, King of Sweden *illus* 32
 Nobel Prizes, presentation 32
H
H.M.T.S. Monarch (cable ship) *See Monarch*
 Halsey, R. J. 76
 Harper, G. E. *illus* 190, 225, 226
 biographical material 226
 Four-Channel Military Carrier Terminal and Repeater 223-26
 Hart, R. R. *illus* 166
 Harvey, William 120
 Haszko, S. E. *illus* 163
 HAVANA, CUBA 43
 HAWAIIAN TELEPHONE CABLE
 service opened 454
 work begun 250
 Hays, J. B. *illus* 511
 Heintzleman, D. Frank 14
 Helmreich, Ralph L.
 biographical material 125
 Kansas State College distinguished service award 125
 Hemingway, Allan 120
Hemo the Magnificent (television show) 60, 120
 Hempstead, C. F. *illus* 241, 245
 biographical material 245
 Versatile Source of Millimeter Waves 241-45
 HERCULES *See* Nike Hercules
 Herring, C. 29
 Hewitt, W. H., Jr. *illus* 464
 Higgins, W. H. C. 18, 115
 HIGH SCHOOLS, physics instruction, improvement 197
High-Speed Data Transmission (W. A. Malthaner) 121-25
 HILLSIDE PLANT (Western Electric)
 transatlantic telephone cable 46
 Hines, M. E., diode amplifier 412
 Hinshelwood, Sir Cyril N.
 Nobel Prize in Chemistry, 1956 33
 Hofmann, L. H. *illus* 13
 biographical material 13
 Switching Control at Television Operating Centers 10-14
 Hogg, D. C. *illus* 496, 497
 biographical material 497
 Propagation of Millimeter Waves through the Atmosphere 494-97

Holcomb, R. T. *illus* 464
 Holden, A. N. 197
 HOLDING TIME
 crossbar systems 131
 relay, wire-spring 131
 HOLMDEL LABORATORY 113, 174
 Honaman, R. K. 154
 Horan, Hubert J., Jr. *illus* 196
 Hornbeck, J. A. 196
 Horton, A. W., Jr. *illus* 338, 341
 biographical material 341
 "Languages" of Digital Computers 338-41
 Housekeeper, William G. 196
 Hough, R. R. *illus* 115, 438
 Assistant Chief Engineer, A.T.&T. 438
 biographical material 115, 438
 Vice President, Laboratories 115
 Howarth, M. H. 273
 Huntley, Harold R. *illus* 357
 biographical material 357
 Chief Engineer, A.T.&T. 357
 HYDROGEN
 (in) germanium 36-37
 HYDROPOL 411

I

I.R.E. *See* Institute of Radio Engineers
 Ilgenfritz, L. M. 210 *illus* 347
 biographical material 347
 Transmission Features of the USAF Submarine Cable System 344-47
 ILLINOIS, UNIVERSITY 197
 ILLINOIS BELL TELEPHONE COMPANY
 C-Ladder Tent, development 104
Improved Microwave Attenuator for Military Use (F. L. Rose) 418
Improved Way to Cut Cylindrical Crystals (F. Barbieri, J. Durand) 428-29
Improvements in Toll Connecting Circuits for Nationwide Dialing (H. H. Felder, V. W. Wagner) 299-303
 INDIANAPOLIS, INDIANA 183
 INDUCTION
 carrier, N-type 100
 defined 100-01
 diagrams 101
 INDUCTOR
 1530A
 illus 101
 noise suppression 102-03
 schematic diagram 102
 1530B
 illus 102
 noise suppression 102-03
 schematic diagram 102
 INFORMATION AGENCY *See* United States Information Agency
 INFORMATION SERVICE, chairs for 219-22
 Ingram, S. B. 196
 INSTITUTE OF RADIO ENGINEERS
 Baker Award, *see* Baker Award
 New York City convention
 talks, by members of the
 Laboratories 198
 Polkinghorn, F. A., Director, election 28

INSTITUTION OF ELECTRICAL ENGINEERS 76
 INSULATION
 plastic, capacitance monitor 308-11
 submarine cables, polyethylene 210
 INTERFEROMETER
 layers, crystal, measurement *illus* 3
Intermarker Group Operation in No. 5 Crossbar
 (M. C. Goddard) 431-34
 INTERNATIONAL COOPERATION 41, 44
 INTERNATIONAL GEOPHYSICAL YEAR
 earth satellites
 transistors, diffused-base 245
 INVERNESS, SCOTLAND 41
 ISOLATOR
 field displacement 456-61
 microwave transmission 166
 ITALIAN NATIONAL RESEARCH COUNCIL
 radio links symposium 268-70
 Ives, Herbert E. 150, 196
 Iwersen, J. C. 222

J

Jack, J. S. 76; *illus*
 Jacobs, O. B. *illus* 210
 biographical material 210
 Evolution of the Transatlantic Cable 206-11
 Jacobsen, J.
 Thermal Time-Delay Relays 148-49
 Jansen, J. J. *illus* 183
 biographical material 183
 Television Terminals for the L3 System 179-83
 Jenkins, R. T. *illus* 348, 352
 biographical material 352
 Distinctive Ringing Signals for the 500 Set 348-52
 Jensen, A. G. *illus* 152
 Jewett, Frank B. 201
 Jimenez, Juan Ramon
 Nobel Prize in Poetry, 1956 33
 JOHN SCOTT MEDAL *See* Scott, John, Medal
 JOHNS HOPKINS UNIVERSITY
 Martin, W. H., honorary degree 315
 Johnson, John B. *illus* 472
 biographical material 472
 Franklin Institute medal 472
 Jones, William H., Jr. 196
 Jorstad, N. K. *illus* 452
 JUNEAU, ALASKA 14

K

K-TYPE CARRIER *See* Carrier
 Kaminski, W. *illus* 121, 123
 KANSAS STATE COLLEGE
 distinguished service award
 Helmreich, R. L. 125
 Kappel, Frederick R. *illus* 232, 233, 455
 A.T.&T. annual meeting, address 232-33
 A.T.&T. Annual Report, 1956 112-14
 engineers, three-dimensional, need for 77
 Future of Communications 34-35
 Telephone Pioneers address 465
 United States Independent Telephone
 Association, address 502
 Karp, A. 242
 Kayton, I. *illus* 463

Keefer, H. J. *illus* 28
 biographical material 28
 Dust on Relay Contacts 25-28
 Keller, Frank 183
 Kelly, Mervin J. *illus* 37, 76, 110, 256, 268, 269, 315,
 357, 455
 Air University Board of Visitors 317
 Atoms for Peace committee 358
 college tuition aid plan 142
 Defense Science Board member 437
 European Symposium on Radio Links 268-69
 Fermi professorship committee, chairman 36
 honorary degree, University of Pittsburgh 315
 National Bureau of Standards post 358
 New York City Board of Education science programs
 156
 Patent, Trade-Mark and Copyright
 Foundation position 317
 transatlantic telephone cable 208
 USAF Exceptional Service Award 357
 Kempf, R. A. *illus* 308, 311
 biographical material 311
 Capacitance Monitor for Plastic Insulated Wires 308-11
 Kendall, Edward C. 52
 Kennedy, W. J.
 Experimental "Drive-In" Coin Telephone 231
 Kerr, John 177
 Ketchledge, R. W. 210
 KEY EQUIPMENT
 102A 490-93
 KEY WEST, FLORIDA 43
 KEY WEST-HAVANA TELEPHONE CABLE 206-07
 Keywell, F. 222
 Killingsworth, H. T. *illus* 455
 Kilmer, William L. 196
 King, A. S. *illus* 105, 108
 biographical material 108
 Modernized Line-Finder Units for Step-by-Step 105-08
 King, F. H. *illus* 143, 145
 biographical material 145
 P1 Rural Carrier: Equipment Features 143-46
 Kircher, R. J.
 W. R. G. Baker Award 56
 Kirchhoff, J. W. *illus* 215
 biographical material 215
 Direct Distance Dialing from Panel and Crossbar Offices
 212-15
 Kleinfelder, W. C. *illus* 499, 501
 biographical material 501
 Cable Splicing Goes Modern 499-501
 Klute, W. A. 250
 Kostelnick, J. J. *illus* 270
 Kocan, J. *illus* 51
 Kopp, William J. *illus* 138
 biographical material 138
 E-Type Repeaters: San Francisco to Oakland Circuits
 135-38
 Kostkos, Henry J. 154-55, 197
 Kotzebue, Kenneth 197
 Kraft, H. *illus* 236
 Krom, M. E. *illus* 172

L

L3 CARRIER *See* Carrier
 LABORATORIES *See* Bell Telephone Laboratories

LABORATORIES FELLOWSHIPS 196-97

Lawrence, Ernest O. 52

Lawton, C. 76

LA BREA, CALIFORNIA 263

Laico, J. P. *illus* 269

Lamberty, F. R. *illus* 263

biographical material 263

Maintenance Features of Step-by-Step AMA 261-63

Lander, J. J. 197

Langmuir, Irving 196

"Languages" of Digital Computers (A. W. Horton, Jr.) 338-41

Larson, Arthur 197

Lazarns, Edna *illus* 414

LEAD

alloy, extrusion 164

Bell System consumption, 1956 161

Leake, Chauncey D. 120

Lebert, A. W. 76; *illus*

Leech, W. H. 76

Leland, Harold R. 196

LEPRECHAUN (digital computer) 272-73

Leutritz, J. *illus* 252, 255

biographical material 255

Bleeding of Oil-Type Preservatives 252-55

Levine, Eugene 197

Lewis, H. A. 76; *illus*

Lewis, W. D. 196

LIFE EXPECTANCY

contacts, relay, central offices 65-68

crossbar systems

5-type 65

polyethylene 113

relays 131, 203, 228

spring

relay, wire-spring 203

telephone poles 252

Lightning Protection of TD-2 Stations (D. W. Bodle) 509-11

Lindner, J. L. *illus* 103

biographical material 103

Suppression of Static and Radio Interference in N-Carrier Cables 100-03

LINE CONCENTRATOR *See* Concentrator

LINE FINDER

step-by-step systems, modernized 105-08

Line-Insulation Testing for Step-by-Step (H. G. Schaffer) 473-76

Litchfield, E. H. *illus* 315

Liu, Bede 197

LOCAL VIDEO TRANSMISSION *See* Transmission: television: A2A system

Lockwood, E. T. 298

LONDON, Transatlantic Telephone Cable 41

Long, M. B. 196

LONG LINES DEPARTMENT

Alaskan Telephone Cable 14

transatlantic telephone cable 46

LOS ANGELES, CALIFORNIA 93, 184-87

Louise, Queen of Sweden *illus* 32

LOUISVILLE, KENTUCKY 183

Low, Herbert M. 125

Lucas, Francis F.

biographical material 437

American Society for Metals honor 437

Luce, Clare Booth 36

Luffman, C. E. *illus* 218

biographical material 218

Miniature Audio Transformers for the P Carrier System 216-18

M

MTC *See* United States Air Force Missile Test Center

McAfee, K. B., Jr. *illus* 236

McCain, James A. 125

McCandless, C. H. *illus* 416

McCarthy, R. H. 273

McDavitt, M. B. *illus* 269

European Symposium on Radio Links 268-69

McDowell, H. L. *illus* 269

McKeehan, L. W. 175

McKenna, James 197

McKillop, V. 76

McMillan, B. 196

McMillan, Edwin M. 52

McNally, J. O. *illus* 76

McSkimin, H. J. 275; *illus*

MacWilliams, W. H., Jr. *illus* 94, 98

biographical material 98

Transistor Gating Matrix for a Simulated Warfare Computer 94-99

Madden, Ann *illus* 84

MADISON, WISCONSIN 101

MAGNETIC ALLOY *See* Supermendur

MAGNETIC TAPE

data transmission 122-25

MAGNETISM 162, 165-66, 175

Magnetography: The Microscopy of Magnetism (F. G. Foster) 175-78

MAGNETOSTRICTION

cobalt ferrite 127

ferrite 126-27

MAINTENANCE

automatic message accounting

step-by-step 261-63

carrier, military, 12-channel 264-67

concentrator, line, remote 171

dust 25

relay, wire-spring, multicontact 132

repeater, AN/TCC-8 264-67

terminal, AN/TCC-7 264-67

test set, field, packaged components 64

Maintenance Features of Step-by-Step AMA (F. R. Lamberty) 261-63

Malthaner, W. A. *illus* 124, 125

biographical material 125

High-Speed Data Transmission 121-25

MANAGEMENT

tomorrow's, Craig, C. F., speech 193

Marconi, Guglielmo 196

MARINE LIFE, destructive power 287

Marine Tests of Organic Materials (L. R. Snoke) 287-92

Marrison, W. A. *illus* 406, 410

biographical material 410

Novel Sources of Electric Power 406-10

- Martin, William H.
Johns Hopkins University honorary degree 315
- Martins, A. S. *illus* 93
biographical material 93
Conversion of Automatic Ticketing to AMA 89-93
- Mason, Warren P. *illus* 234
Audio Engineering Society award 453
delay line, torsional wave 234
- MASSACHUSETTS INSTITUTE OF TECHNOLOGY 197
DEW Line work 18
Fisk, J. B., speech 260
- Matthias, B. *illus* 271
triglycene sulphate, discovery 271
- MATRIX
gating, transistor, computer, simulated warfare 94-99;
illus 96
- Mattke, C. F. *illus* 152
- Meagher, R. E. 146
- MEASUREMENT
crystal, conductivity layers 1-5
ultrasonic, diamond, elastic moduli 275-76
- Meigs, P. S. *illus* 469
- MEMORY DEVICES
twistor 488-89
- Mendizza, A.
A.S.T.M. Sam Tour Award 358
- Melhop, Werner A. W. 197
- Mendenhall, H. E. 196
- Mercereau, James E. 196
- MESSAGE ACCOUNTING *See* Automatic Message Accounting
- Meszáros, G. W. 211; *illus* 76
- METAL(s)
Bell System consumption, 1956 161
Bell System requirements 162
corrosion 201
creep 201-05
fabrication 164
fatigue 201-05
friction 201
mechanical properties 164
mechanical properties 162
relaxation 201-05
strain 202, 204
stress 201-03
wear 201
"whiskers," *see* Whisker
- METALLURGICAL MICROSCOPE *See* Microscope
- METALLURGICAL RESEARCH DEPARTMENT 161-67
- METALLURGIST(s), function 161-67
- Metallurgist's View of Metallurgy* (E. E. Schumacher)
161-67
- METALLURGY
metallurgist's view of 161-67
strides 250
- MIAMI, FLORIDA 183
- MICRODEVIOMETER
periodic structures, evaluation 498
- MICROSCOPE
metallurgical *illus* frontcover Jan
optical
illumination
brightfield *illus* 176
darkfield *illus* 176
magnetography 175-78
- MICROWAVE
oscillator, solid-state, invention 109; *illus* frontcover
Mar, 109
physical phenomena 241
transmission, *see* Transmission
usefulness 241
- MICROWAVE AMPLIFIER *See* Amplifier
- MICROWAVE ATTENUATOR *See* Attenuator
- MICROWAVE CIRCULATOR *See* Circulator
- MICROWAVE RELAY SYSTEMS
TD-2, lightning protection 509-11
TH 269-70, 412
TJ 153
Florida-Cuba 430
short-haul, use predicted 298
- MIDDLETON ISLAND 21
- MILITARY COMMUNICATIONS
Alaskan Telephone Cable 14
Bell System 114
Bell Telephone Laboratories structure 115
carrier
equalization 72-75
military
12-channel
maintenance 264-67
order circuit 264-67
DEW Line 18, 194-96, 435
Gunnery System Simulator, transistorized 94-99
Leprechaun (digital computer) 272-73
microwave attenuator 418
modulator, TA-219/U 188-91
Nike 147
Nike Hercules 147
"packaged" equipment
test set, field 61-64
Radar Approach Control Centers 490-93
repeater, AN/TCC-8 264-67
SAGE data transmission service 401-05
terminal
AN/TCC-3 223-26
AN/TCC-5 223-26
AN/TCC-7 264-67
TRADIC 84
USAF Missile Test Center submarine cable 211, 344-47
"White Alice" 21
- Miller, S. E. *illus* 463, 464
- MILLIMETER WAVE *See* Wave
- Millman, S. 196-97, 242
- MILWAUKEE, WISCONSIN 101
- Miniature Audio Transformers for the P Carrier System*
(C. E. Luffman) 216-18
- MINIATURIZATION
carrier, P1 69, 216-18
polymers 249
- Miniaturized Tantalum Solid Electrolytic Capacitors* (Florence S. Power) 419-22
- MINNESOTA, UNIVERSITY OF
Brattain, Walter H., honorary degree 315
- MISSILE *See* Guided Missiles
- MISSILE TEST CENTER *See* United States Air Force Missile Test Center
- Mitchell, W. *illus* 448
- MOBILE TELEPHONE SERVICE
airlines 326-30, 471
- MOBILE, ALABAMA 231
- Modernized Line-Finder Units for Step-by-Step* (A. S. King)
105-08

Modern Crossbar PBX (O. H. Williford) 485-87
 MODULATION, carrier 179-80
 MODULATOR, TA-219/U 188-91
 Moe, Gordon K. 120
 MOLLUSKS 287-92
 Molnar, J. P. *illus* 115, 438
 biographical material 115, 438
 Director, Military Development 115
 Vice President, BTL 438
Monarch (cable ship) *illus* 42
 cable laying 47
 Hawaiian telephone cable 250
 modifications 47
 Monk, Newton *illus* 330
 Air-Ground Circuit for Airlines 326-30
 biographical material 330
 MONTREAL
 Transatlantic Telephone Cable 41
 MOON, Artificial *See* Earth Satellite
 Morris, Lester H. 446; *illus* 448
 Morrison, James B. *illus* 154
 Morrison, L. W. *illus* 115
 biographical material 115
 Director, Guided Missile Development 115
 Morrow, J. J. *illus* 315
 Morse, M. F. *illus* 413, 416
 biographical material 416
 Traffic-Usage Measuring: The Key to Dial Office Engineering 413-17
 Morse, Samuel F. B. 227
 Moster, C. R. *illus* 269
 Mottram, E. T. *illus* 47, 76
 biographical material 47
 First Transatlantic Telephone Cable System 41-47
 Mueller, R. *illus* 230
 biographical material 230
 Relays in the Bell System: Facts and Figures 227-30
 Multhaupt, R. P. 155
 MULTICONTACT WIRE-SPRING RELAY *See* Relay: wire-spring
 MURRAY HILL LABORATORY
 transatlantic telephone cable 46-47
 Mustillo, A. J. *illus* 173

N

N-TYPE CARRIER *See* Carrier
 NI CARRIER *See* Carrier
 Nance, R. C. *illus* 507
 Automatic Calculation of Transmission Deviations 503-07
 biographical material 507
 NATIONAL ACADEMY OF SCIENCES
 Laboratories personnel members 215
 NATIONAL ASSOCIATION FOR BETTER RADIO AND TELEVISION
 Bell System Science Series award 183
 NATIONAL BUREAU OF STANDARDS
 Statutory Visiting Committee
 Kelly, Mervin J. 358
 NATIONAL CONFERENCE ON AERONAUTICAL ELECTRONICS
 Dayton meeting 222
 NATIONAL CONFERENCE OF CHRISTIANS AND JEWS
 Telephone Time award 183
 NATIONAL ELECTRONICS CONFERENCE
 Laboratories papers presented 477
 NATIONAL SCIENCE FOUNDATION 197

NAVY *See* United States Navy
 Nelson, J. T. 222
New Gloves for Linemen (W. S. Youry) 192
 NEW HAVEN, CONNECTICUT
 automatic message accounting center 251
New School for Operating Company Engineers
 (J. N. Shive) 446-49
 NEW YORK-AZORES CABLE 206
 NEW YORK CITY
 A2A television system field trial 87
 Transatlantic Telephone Cable 41
 NEW YORK CITY BOARD OF EDUCATION
 Kelly, Mervin J., science programs 156
 NEW YORK UNIVERSITY
 graduate-study center plan 235, 429, 449
 NEW YORK TELEPHONE COMPANY 30
 NICKEL
 Bell System consumption, 1956 161
 consumption 162
 NICKEL SILVER
 fatigue properties 162
 Nielsen, G. *illus* 483
 Nielsen, J. W. 236
 NIKE 147
 Hercules, *see* Nike Hercules
 NIKE HERCULES 147
 Nobel, Alfred 33
 NOBEL PRIZE IN CHEMISTRY
 1956
 Hinshelwood, Sir C. N. 33
 Semenov, N. 33
 NOBEL PRIZE IN LITERATURE
 1956
 Jimenez, J. R. 33
 NOBEL PRIZE IN MEDICINE
 1956
 Cournaud, A. 33
 Forssman, W. 33
 Richards, D. W. 33
 NOBEL PRIZE IN PHYSICS
 1956
 Bardeen, J. 32-33
 Brattain, W. H. 32-33
 Shockley, W. 32-33
 medal *illus* 116
 NOBEL PRIZES
 awards, 1956 32-33
 NOISE
 A2A system 87-88
 carrier, N-type, suppression 100-03
 transatlantic telephone cable 44-46
 NORTHERN ELECTRIC COMPANY
 transatlantic telephone cable 46
Novel Sources of Electric Power (W. A. Marrison) 406-10
 NUMBER(S) *See* Telephone Numbers
 NUMBER 1 CROSSBAR SYSTEM *See* Crossbar Systems
 NUMBER 4A TOLL CROSSBAR SYSTEM *See* Crossbar Systems
 NUMBER 5 CROSSBAR SYSTEM *See* Crossbar Systems
 NUMBER 35-TYPE FUSE *See* Fuse
 NUMBER 70-TYPE FUSE *See* Fuse
 NUMBER 102A KEY EQUIPMENT *See* Key Equipment
 NUMBER 153A AMPLIFIER *See* Amplifier
 NUMBER 235 RELAY *See* Relay
 NUMBER 235D RELAY *See* Relay

NUMBER 235E RELAY *See* Relay
 NUMBER 271A RELAY *See* Relay
 NUMBER 282A RELAY *See* Relay
 NUMBER 355A DIAL OFFICE *See* Central Office
 NUMBER 500 TELEPHONE SET *See* Telephone Set
 NUMBER 557A SWITCHBOARD *See* Switchboard
 NUMBER 557B SWITCHBOARD *See* Switchboard
 NUMBER 756A PBX *See* Private Branch Exchange
 NUMBER 1530A INDUCTOR *See* Inductor
 NUMBER 1530B INDUCTOR *See* Inductor
 Nyquist, Harry
 Audio Engineering Society award 453

O

I-TYPE CROSSBAR SYSTEM *See* Crossbar Systems
 102A KEY EQUIPMENT *See* Key Equipment
 153A AMPLIFIER *See* Amplifier
 1530A INDUCTOR *See* Inductor
 1530B INDUCTOR *See* Inductor
 O-TYPE CARCINOTRON *See* Oscillator: backward-wave
 OAK RIDGE NATIONAL LABORATORY
 chloroplasts, semiconducting properties 195
 OAKLAND, CALIFORNIA 135-38, 183
 OBAN, SCOTLAND 41
Ocean Layer (cable ship) 250
 Och, H. G. 115
 OFFICE *See* Central Office
 Ohl, R. S. 195
 Ohm, E. A. *illus* 239, 297
 biographical material 297
 Broad-Band Microwave Circulator 293-97
 Oliver, B. B. *illus* 448
One-Man Aerial Tent (E. L. Alford) 104
 OPERATING CENTER *See* Television Operating Center
 OPERATING COMPANIES
 answering-service companies
 switchboards 6-9
 railroad tunnels, radio communication 57
 See also names of specific operating companies, e.g.,
 New York Telephone Company
 OPERATING ENGINEERS TRAINING PROGRAM 446-49
 OPERATOR *See* Telephone Operators
 OPTICAL MICROSCOPE *See* Microscope
 ORGANIC MATERIALS, testing, marine 287-92
 Orttung, William H. 197
 OSCILLATOR
 backward-wave
 advantages 241
 component parts *illus* 243
 electron beam 242-43
 electron gun 243
 evolution *illus* 242
 5-mm, schematic diagram 242
 period length 242
 waves, millimeter 241-45
 microwave
 solid-state 109; *illus* frontcover Mar, 109
 solid-state
 microwaves 109; *illus* frontcover Mar, 109
 traveling-wave description 242
 O'Shea, J. C. *illus* 448
 OSLO
 Transatlantic Telephone Cable 41

Our Mr. Sun (television show)
 awards 183, 515
 OXYGEN
 (in) germanium 36-37

P

P1 CARRIER *See* Carrier
 PBX *See* Private Branch Exchange
P1 Rural Carrier: Equipment Features (F. H. King, A. J. Wier) 143-46
 PACIFIC TELEPHONE AND TELEGRAPH COMPANY
 Alaskan Telephone Cable 14
 Hawaiian telephone cable 250
 PACKAGED AMPLIFIER *See* Amplifier
 PAINT
 conductive 331-35
 resistive 331-35
 PALLADIUM CONTACT *See* Contact
 Palmer, A. L. *illus* 251
 PANEL CROSSBAR SYSTEM *See* Crossbar Systems
 PAPERS by members of the Laboratories 38-39, 80, 119,
 159-60, 200, 240, 280, 319-20, 359-60, 438-39,
 479-80, 517-18
 PARABOLIC ANTENNA *See* Antenna
 Parks, C. O. *illus* 215
 biographical material 215
 Direct Distance Dialing from Panel and No. 1 Crossbar
 Offices 212-15
 PARIS, Transatlantic Telephone Cable 41
 PATENT, TRADE-MARK AND COPYRIGHT FOUNDATION
 Kelly, Mervin J. 317
 PATENTS, issued to members of Bell Telephone Laboratories
 38, 78, 103, 160, 199, 239, 279, 320, 359, 434, 480, 517
 PATENTS AND PATENTING
 Bell Telephone Laboratories 462-65
 Patterson, M. D. *illus* 304, 305
 Pearson, Gerald L. *illus* 196
 John Scott Medal 196
 PENNSYLVANIA RAILROAD
 Hudson River tunnels, radio communication 57-60
 PENTA (pentachlorophenol)
 bleeding 252-55
 PERIODIC STRUCTURES, microdeviometer evaluation 498
Performance of the A2A Video Transmission System (R.
 W. Edmonds) 85-88
 Peters, Henry *illus* frontcover Oct, 411
 polyethylene bonding 411
 Peterson, A. E., Jr. *illus* 189, 191
 Basic Modulation Unit for Military Carrier Systems
 188-91
 biographical material 191
 Pfann, William G. *illus* 472
 biographical material 472
 Franklin Institute medal 472
 Phair, R. J. *illus* 333, 335
 biographical material 335
 Conductive and Resistive Coatings 331-35
 Phalen, C. W. *illus* 455
 PHILIPS RESEARCH LABORATORIES, Holland 130
 PHONEMES 282
 PHOSPHOR BRONZE, fatigue properties 162

- PHOTOTRANSISTOR
 finger-mounted
 switchboard
 blind personnel operation 30-31
 circuit, schematic diagram 31
- PHYSICIST(s)
 future of 111
 (in) industry 111
- PHYSICS
 high school teaching 197
 solid-state 166
- PHYSICS PRIZE *See* Nobel Prize in Physics
- PICTURE-PHONE 152
- Pierce, J. R. 215
- PIGMENT
 carbon black
 electron micrographs 247
 polymers 246-50
 morphology 249
 properties 247
- Pigments in Polymer Materials* (J. F. Ambrose) 246-50
- Pilliod, Mary E. *illus* 512, 514, 515
 biographical material 515
Printer-Comparer-Scanner for AMA 512-15
- PITTSBURGH, UNIVERSITY OF
 Kelly, Mervin J., honorary degree 315
- PLASTIC INSULATION *See* Insulation
- PLASTICS
 polymers, additives 246-50
- POCKET-RADIO SIGNALING 343
- POINT-AND-DISC CONTACT *See* Contact
- POINT-CONTACT TRANSISTOR *See* Transistor
- POLE *See* Telephone Poles
- Polkinghorn, Frank A.
 biographical material 28
 I.R.E. Director, election 28
- POLYETHYLENE
 insulation, submarine cable 210
 life 113
 model *illus* 247
 production 411
- POLYMER(s)
 electrical properties 249
 natural, additives 246-50
 pigments in 246-50
 synthetic, additives 246-50
- POLYSTYRENE-BUTADIENE, model *illus* 247
- PORT ANGELES, WASHINGTON 14
- Portelli, Miss R. *illus* 30
- Porter, R. M. *illus* 462, 465
 biographical material 465
Effective Patents: A Cooperative Effort 462-65
- PORTLAND, MAINE 42
- POST OFFICE *See* British Post Office
- POSTURE, chairs 219
- Potter, J. A. 211
- POTTING COMPOSITION 248
- Power, Florence S. *illus* 419, 422
 biographical material 422
Miniaturized Tantalum Solid Electrolytic Capacitors
 419-22
- Power, J. R. *illus* 51, 52
 biographical material 52
Tone Ringer 48-52
- POWER
 sources, novel 406-10
- POWER SUPPLY
 Bell Solar Battery 21
 carrier, P1 19-21
 concentrator, line, remote 171
Power Supplies for the P1 Rural Carrier System (D. H. Smith) 19-21
- PRATT INSTITUTE
 Espenschied, L., honorary degree 315
- PRINTED CIRCUITRY
 carrier, P1 143
- PRINTED WIRING *See* Printed Circuitry
- Printer-Comparer-Scanner for AMA* (Mary E. Pilliod)
 512-15
- PRIVATE BRANCH EXCHANGE
 756A 485-87
 switchboard, *see* Switchboard
- PROBABILITIES, traffic 413
- PROJECTOR, defocusing 481-84
- Propagation of Millimeter Waves through the Atmosphere*
 (A. B. Crawford, D. C. Hogg) 494-97
- PROTECTION
 lightning
 TD-2 stations 509-11
- PULSE, dial 15-18
- Q**
- Quarles, Donald A.
 Yale University honorary degree 315
- Quintavalle, U. *illus* 268
- R**
- RAPCON *See* Radar Approach Control Centers
- RLC *See* Concentrator: line: remote
- RADAR
 packaged amplifiers, test set, field 61-64
- RADAR APPROACH CONTROL CENTERS
 102A key equipment system 490-93
- RADAR SYSTEMS
 SAGE data transmission service 401-05
- RADIO DETECTION AND RANGING *See* Radar
- RADIO INTERFERENCE
 carrier, N-type, suppression 100-03
- RADIO RELAY SYSTEMS *See* Microwave Relay Systems
- Radio Transmission in Railroad Tunnels* (H. S. Winbiger)
 57-60
- RADIO TUBE *See* Electron Tube
- Radley, Sir Gordon 44, 76
- RADOME
 construction *illus* 194
 Whippany Laboratory 18
- RAILROAD RADIO, tunnels 57-60
- RAILROAD TUNNELS
 radio communication 57-60
- Ranchle, W. F. *illus* 180
- Read, W. T., Jr. 209
- RECORD *See* Bell Laboratories Record
- "Recorded Carrier" System for High-Speed Data Transmission* (R. M. Gryb) 321-25
- RECORDING TAPE *See* Magnetic Tape
- Rehm, T. C. *illus* 423, 427
AMA Assembler-Computer 423-27
 biographical material 427

RELAXATION

- connections, solderless wrapped 205
- metals 201-05

RELAY

- 235 148
- 235D 148
- 235E *illus* 148
- 271A 149
- 282 *illus* 149
- 282A 149
- automation 216
- contact, *see* Contact
- cost 230
- crossbar systems, 5-type, life requirements *graph* 228
- defined 227
- history 227
- life expectancy 203
- production *graph* 227
- springs 162
- types *illus* 228
- wire-spring
 - contacts 67-68
 - life 131, 203
 - multicontact 131-34
 - technology 131

Relay Contact Life in Central Offices (A. P. Geotze) 65-68

RELAY SYSTEM *See* Microwave Relay System

Relays in the Bell System: Facts and Figures (R. Mueller) 227-30

RELIABILITY

- concentrator, line, remote 171
- contacts, relay, central offices 65-68

Remote Line Concentrator for No. 5 Crossbar (G. E. Fessler) 168-74

Remote Positions for CAMA (F. N. Rolf) 353-56

REPEATER

- AN/TCC-5 223-26
- Bell System facts and figures 227-30
- E-type
 - Oakland-San Francisco service 135-38
 - submarine cable 135-38
- E13, *block diagram* 136
- Transatlantic Telephone Cable 29, 207-09, 257

Replogle, J. O. *illus* 225

RESISTOR

- automation 216

Rettaliata, John T.

- Western Electric director 156

Ribett, Doris *illus* 69, 71

- biographical material 71

Carrier-Frequency Transformers for P1 Carrier 69-71

Richards, Constance L. *illus* 32

Richards, Dickinson W.

- Nobel Prize in Medicine, 1956 33

Riggs, G. *illus* 251

Automatic Message Accounting Centers in 1957 251

RINGER, tone, *see* Tone Ringer

RINGING

- telephone set, 500-type 348-52

Roberts, L. F. *illus* 154

ROCKY MOUNT, NORTH CAROLINA

- radio relay route 167

Rolf, F. N. *illus* 355

- biographical material 355

Remote Positions for CAMA 353-56

Romnes, H. I. *illus* 455

Ronci, V. L. 208-09

Rose, A. C. *illus* 464

Rose, F. L.

Improved Microwave Attenuator for Military Use 418

Ross, Donald

A.S.C.E. Hilgard Prize, award 437

Rossi, Bruno 52

Rounds, P. W. *illus* 454

Rudberg, Erik 33

Ruppel, A. E. *illus* 405

- biographical material 405

SAGE Data Transmission Service 401-05

RURAL CARRIER *See* Carrier: P1

RURAL TELEPHONE SERVICE

carrier, P1, power supplies 19-21

Russell, James S. 156

RUSSIA

- science in 110

RUTGERS UNIVERSITY

Dodge, Harold F., faculty appointment 36

Terry, Milton E., faculty appointment 36

Ryan, F. M. 298

S

70-TYPE FUSE *See* Fuse

756A PBX *See* Private Branch Exchange

SAGE Data Transmission Service (A. E. Ruppel) 401-05

Saarinén, Ero, and Associates

Holmdel expansion 174

SAINT JOHN, NEW BRUNSWICK 42

SAN ANTONIO, TEXAS 183

Sansalone, F. J. *illus* 270

SAN FRANCISCO, CALIFORNIA

Automatic Message Accounting 93

Oakland service, E-type repeaters 135-38

SAN FRANCISCO BAY *map* 136

Sandberg, Irwin W. 196

SATELLITE *See* Earth Satellite

Sauer, H. A. 236

Sawyer, Carleton R.

Audio Engineering Society award 453

Scaff, J. H. 195

Schaffer, H. G. *illus* 473, 476

- biographical material 476

Line-Insulation Testing for Step-by-Step 473-76

Schindler, George E., Jr.

- biographical material 138

RECORD editor, appointment 138

Scaife, A. B. *illus* 315

Schmidt, H. V. 317

Vice President, Western Electric 273

Schmitt, P. H. *illus* 165

Schumacher, Earle E. *illus* 167

- biographical material 167

Metallurgist's View of Metallurgy 161-67

Schwartz, S. P. 273

Schwenker, J. E. *illus* 121

SCOTT, JOHN, MEDAL

Chapin, D. M. 196

Fuller, C. S. 196

history 196

Laboratories personnel awarded 196

Pearson, G. L. 196

- SEADROME(s)
transatlantic telephone cable, proposed 207-08; *illus* 207
- SCIENCE SERIES *See* Bell System Science Series
- Scovil, Derrick *illus* frontcover Mar, 109
solid-state microwave oscillator, invention 109
- SEATTLE, WASHINGTON 14
- SECONDARY INDUCTION *See* Induction
- Seidel, Harold *illus* frontcover Mar, 109
solid-state microwave oscillator, invention 109
- Semenov, Nikolai
Nobel Prize in Chemistry, 1956 33
- SEMI-AUTOMATIC GROUND ENVIRONMENT *See* SAGE
- Semi-Automatic Test Set for Varistors* (H. F. Dienel) 304-07
- SEMICONDUCTOR(s), SEMICONDUCTING MATERIALS
bonding
thermoccompression 336, 443-45
chloroplasts 195
electrical properties, altering 165
transistors 1
washing 337
- Semmelman, C. L. *illus* 75
biographical material 75
Equalization of Military Carrier Telephone Systems 72-75
- SERVICE MAINTENANCE *See* Maintenance
- SET *See* Data Subset; Telephone Set; Test Set
- Shannon, Claude E. 52, 215
- Shaver, Charles W. 125
- Shaver, Judith *illus* 30
- Shea, T. E.
biographical material 317
BTL Board of Directors, election 317
Vice President, Western Electric 273
- SHEATH
cable
aluminum 163-64
creep 204
fatigue failures 204
polyethylene 247
- Sheldon, H. E. *illus* 448
- Sherwood, Helen K. 195
- Shive, J. N. 197; *illus* 448, 449
biographical material 449
New School for Operating Company Engineers 446-49
- Shockley, W. 235; *illus* 33
Nobel Prize in Physics, 1956 32-33
- Shores, S. C. *illus* 310
- SIGNAL CORPS *See* United States Army Signal Corps
- SILICON, deformation 165
- SILICON CARBIDE VARISTOR *See* Varistor
- SILICON POWER TRANSISTOR *See* Transistor
- SIGNAL(s), SIGNALING
pocket-radio 343
See also Digital Data Signaling System
- SILVER
nickel, fatigue properties 162
- SILVER CONTACT *See* Contact
- SIMPLEX WIRE AND CABLE COMPANY 46
- Simulating Sharpness in Color Television* (M. W. Baldwin, Jr.) 481-84
- SINGLE CONTACT *See* Contact
- SKAGWAY, ALASKA 14
- Skrabal, R. J. *illus* 452, 453
biographical material 453
Thirty-Foot Antenna for the DEW Line 450 53
- SLEEVE, punched, cable splicing 276
- Slichter, W. P. 197
- Smith, J. L. *illus* 508
- Smith, D. H. *illus* 21
biographical material 21
Power Supplies for the P1 Rural Carrier System 19-21
- Smith, R. W. 155
- SMITHSONIAN INSTITUTION
telephone exhibit 154-55
- Snell, W. W., Jr. *illus* 295
- Snoke, Lloyd R. *illus* 287, 291, 292
biographical material 292
Marine Tests of Organic Materials 287-92
- SOLAR BATTERY *See* Bell Solar Battery
- SOLDER
alloys 163
Bell system consumption 163
- SOLDERLESS WRAPPED CONNECTION *See* Connection
- SOLID(s), adhesion 441-45
- SOLID-STATE OSCILLATOR *See* Oscillator
- SOLID-STATE PHYSICS 166
- SOUTHERN BELL TELEPHONE COMPANY
Gilmer, Ben S., President, election 78
- SPACE STATION *See* Earth Satellite
- Sparling, W. S.
Ohio Bell Telephone Company President 357
- SPEECH
bandwidth, compression 281
redundancy 283
- SPEED, in testing 304
- Spencer, H. H. 211; *illus* 76
- "SPIRAL-FOUR" CABLE *See* Cable
- SPLICING
cable
pneumatic 499-501
sleeves, punched 276
- SPRUCE LAKE, NEW BRUNSWICK 42
- STANDARDS ENGINEERS SOCIETY
Arlt, H. G., president 156
- STANDARD TELEPHONES AND CABLES, LIMITED 46
- STATIC *See* Noise
- Stearns, R. *illus* 133
biographical material 133
Wire-Spring Multicontact Relay 131-34
- STEEL
Bell System consumption, 1956 161
- Stewart, G. D. *illus* 6, 9
biographical material 9
Switchboards for Telephone Answering Services 6-9
- Stibitz, George R. 83
- Stinehelfer, H. E. 21
- STOCKHOLM
Transatlantic Telephone Cable 41
- Strange Case of the Cosmic Rays* (television program) 436-37
- Strauss, Lewis 36
- STRESS AND STRAIN
metals 164, 201-03

Strnad, A. R. *illus* 243, 244, 245
 biographical material 245
 Versatile Source of Millimeter Waves 241-45

Strickler, W. B. *illus* 416

STYRENE MONOMER, model *illus* 247

STROWGER DIAL SYSTEM 227

SUBMARINE CABLE
 development 206
 evolution 206
 insulation, polyethylene 210
 research 206
 repeaters
 E-type 135-38
 San Francisco-Oakland 135-38
 USAF Missile Test Center
 transmission features 344-47

SUBMARINE CABLES, LIMITED 46

SUBSET *See* Data Subset

Suhl, H. *illus* 316

Sullivan, Miles V. *illus* 337

SUPERMENDUR
 characteristics 99

SUPPLY, power, *see* Power Supply

Suppression of Static and Radio Interference in N-Carrier Cables (J. L. Lindner) 100-03

Sweney, F. J. *illus* 70

SWITCH, dry-reed 131

SWITCHBOARD
 557A 6-9
 557B 6-9
 answering-service facilities *block diagram* 7
 trunk calls arrangement *block diagram* 9
 chairs 219-22
 private branch exchange
 blind personnel operation
 phototransistor aid 30-31

Switchboards for Telephone Answering Services (G. D. Stewart) 6-9

SWITCHING
 contacts, *see* Contact
 direct distance dialing 53
 research possibilities 34
 television operating centers 10-14
 transistor 94

Switching Control at Television Operating Centers (C. A. Collins, L. H. Hofmann) 10-14

SWITCHING SYSTEMS
 electronic 48
 step-by-step
 automatic message accounting maintenance 261-63
 line-finder units, modernized 105-08
 modernization 105
 production 105

SWITCHING SYSTEMS
 See also Crossbar Systems

SYDNEY MINES, NOVA SCOTIA 42

T

35-TYPE FUSE *See* Fuse

235 RELAY *See* Relay

235E RELAY *See* Relay

235D RELAY *See* Relay

271A RELAY *See* Relay

282A RELAY *See* Relay

355A DIAL OFFICE *See* Central Office

TA-219/U MODULATOR *See* Modulator

TD-2 MICROWAVE RELAY SYSTEM *See* Microwave Relay Systems

TH MICROWAVE RELAY SYSTEM *See* Microwave Relay Systems

TJ MICROWAVE SYSTEM *See* Microwave Relay Systems

TOC *See* Television Operating Center

TV *See* Television

"TALKING PATH" ELECTRON TUBE *See* Electron Tube

TALKS, by members of the Laboratories 39-40, 79-80, 117-18, 158-59, 198-99, 237-79, 277-79, 318-19, 360, 439-40, 478-79, 518-20

TANTALUM
 capacitor, electrolyte, solid 419-22

TAPE *See* Magnetic Tape

TELEPHONE *See* Dial Telephone

Telephone Communications for RAPCON Centers (G. A. Giddings) 490-93

TELEPHONE COMPANIES *See* Operating Companies

TELEPHONE CORDS 22-24

TELEPHONE NUMBERS
 Bell System standard plan 139
 crossbar systems, 5-type, divisions 139-42

TELEPHONE OPERATORS, chairs 219-22

TELEPHONE PIONEERS OF AMERICA
 Kappell, F. R., address 465

TELEPHONE POLES
 life expectancy 252
 preservatives oil-type, bleeding 252-55
 500-type
 ringing 348-52
 tone ringer modifications *illus* 50

TELEPHONE TIME (television series) 183

TELETYPE CORPORATION, 50th anniversary 356

TELETYPEWRITER SERVICE
 Transatlantic Telephone Cable 41-42

TELEVISION
 Bell Laboratories research 150
 Bell System facilities 85
 Bell System networks *map* 157
 color
 sharpness, simulation 481-84
 signal 86
 local transmission, *see* Transmission: television: A2A system
 operating center, *see* Television Operating Center
 30 years of progress 150-52
 transmission, *see* Transmission

TELEVISION OPERATING CENTER
 switching control 10-14

Television Terminals for the L3 System (J. J. Jansen) 179-83

TEMPERATURE
 creep, metals 201
 stress, metals 164

TENT *See* Aerial Tent

TERMINAL
 AN/TCC-3 223-26
 AN/TCC-7, order circuit, *schematic diagram* 265
 AN/TCC-8, maintenance 264-67
 television, L3 carrier 179-83

Terry, Milton E.
 biographical material 36
 Rutgers University appointment 36

TEST(S), TESTING

- biochemical oxygen demand 290-91
- contact, silver 67
- dials, equipment 15-18
- dust 25
- line insulation, step-by-step systems 473-76
- marine, organic materials 287-92
- speed in 304
- telephone cords 22-24
- varistor, silicon carbide 304-07
- See also Test Set

TEST SET

- field, amplifiers, "packaged" 61-64
- Testing Telephone Cords* (W. S. Eno) 22-24
- Thayer, Gordon N. 298; *illus* 357
- biographical material 357
- Ohio Bell Telephone Company Vice President 357

THERMAL CONDUCTIVITY See Conductivity

Thermal Time-Delay Relays (J. Jacobsen) 148-49

THERMISTOR

- military carrier, equalization 73
- THERMO-COMPRESSION BONDING 336, 443-45

THERMOELECTRIC GENERATOR See Generator

Thirty-Foot Antenna for the DEW Line (R. J. Skrabal) 450-53

Thomas, D. E. 209

Thompson, W. G. *illus* 455

THUNDERSTORM(S)

- N-carrier, interference 101

Thurmond, C. D. *illus* 36

Thurston, R. N. 234; *illus*

TICKETING See Automatic Ticketing

Tidd, W. H. 21

Tillman, R. J. *illus* 210

TIME See Holding Time

TIN

- Bell System consumption, 1956 161
- (in) germanium 417

Tinus, W. C. 115

Tone Ringer (F. L. Crutchfield, J. R. Power) 48-52

TORSIONAL WAVE DELAY LINE See Delay Line

Townes, C. H. 109

Townsend, J. R.

- American Standards Association award 516

TRADIC 84

Traffic-Usage Measuring: The Key to Dial Office Engineering (M. F. Morse) 413-17

Transatlantic Submarine Cable Design (M. E. Campbell, J. M. Fraser) 256-60

TRANSATLANTIC TELEPHONE CABLE 41-47

- cable laying 47
- circuits 256-60
- companders 44
- design 256-60
- equalizers 47
- evolution 206-11
- history 42-43
- map 42, 257
- North Atlantic link
- electron tubes 257
- repeaters 257
- transmission path, design 256-60
- objectives 44-45
- ownership 41

repeaters 29, 207-09, 257

second planned 455

service inauguration 14, 47

splicing *illus* frontcover Feb

teletypewriter facilities 41-42

TRANSATLANTIC TELEPHONE CABLE CONFERENCE 76

TRANSFORMER

audio

- carrier
- N-type 218
- P-type 216-18
- carrier-frequency
- carrier
- N1 69
- P1 69-71
- construction details *illus* 217
- exploded drawing 217

TRANSISTOR

- amplification 94
- application, first 94-99
- carrier, P1 143
- conductivity layers 1
- data subset 123
- diffused-base earth satellite 245
- digital computers 84, 99
- introduction 162
- Leprechaun (digital computer) 272-73
- photo-, see Phototransistor
- point-contact, application, first 94-99
- reliability 466-70
- semiconductor devices 1
- silicon power, development 222
- surfaces 466-70
- switching 94

TRANSISTOR DIGITAL COMPUTER See TRADIC

Transistor Gating Matrix for a Simulated Warfare Computer (W. H. Macwilliams, Jr.) 94-99

Transistors, Reliability, and Surfaces (C. G. B. Garrett) 466-70

TRANSLATOR CARD See Card

TRANSMISSION

- data, see Data Transmission
- deviations, calculation, automatic 503-07
- digital, see Data Transmission
- microwave, isolators 166
- research possibilities 34
- television
- A2A system 85-88, 151
- toll, trunks, improvements 299-303
- video, see Transmission television
- wave, millimeter 494-97

Transmission Features of the USAF Submarine Cable System (L. M. Ilgenfritz) 344-47

TRANSMISSION LINES

- fatigue failures 203-04

TRANSMISSION SYSTEMS

- equalization, see Equalization

TRANSMITTER

- earth satellite, transistors, diffused-base 245

TRANSPORT PHENOMENA 167

TRAVELING-WAVE OSCILLATOR See Oscillator

Treadon, N. C. 155

Trent, R. L.

- W. R. G. Baker Award 56

TRIGLYCENE SULPHATE 271

- crystal *illus* frontcover July

Trucksess, D. E. 211
 Trumbore, F. A. *illus* 417
 tin-germanium studies 417
 TRUNK(s), TRUNKING
 dialing, nationwide 299-303
 deviations, calculation 503-07
 switchboard, 557B, *block diagram* 9
 TUBE *See* Electron Tube
 Tucker, R. S. *illus* 76
 TUITION AID PLAN 142
 TUNNEL(s), railroad, radio communication 57-60
 Turner, E. H. *illus* 462
 Turner, Fred J. 78
Twelve-Channel Military Carrier: Order Circuit and Maintenance (H. C. Fleming) 264-67
 TWIN CONTACT *See* Contact
 TWISTOR 488-89
 Tylee, F. 176

U

U.S.I.A. *See* United States Information Agency
 Uhlenbeck, George E. 52
 Uhler, A., Jr. *illus* 412
 semiconductor diode converter 412
 UNITED STATES AIR FORCE
 Exceptional Service Award
 Kelly, Mervin J. 357
 amplifiers, packaged, test set, field 61-64
 Distant Early Warning Line
 sites completed 18, 194-95; *illus*
 Leprechaun (digital computer) 272-73
 "packaged" equipment, testing 61
 TRADIC 84
 UNITED STATES AIR FORCE MISSILE TEST CENTER
 submarine cable system
 transmission features 211, 257, 344-47
 UNITED STATES ARMY SIGNAL CORPS
 Alaskan Telephone Cable 14
 UNITED STATES INDEPENDENT TELEPHONE ASSOCIATION
 Kappell, F. R., address 502
 UNITED STATES INFORMATION AGENCY
 Bell Telephone Laboratories
 Certificate of Merit awarded 197
 UNITED STATES NAVY
 Gunnery System Simulator, transistorized 94-99
 UNIVERSITY OF CHICAGO. *See* Chicago. University
 Urban, M. J. *illus* 421

V

V MODEL DIGITAL COMPUTER *See* Digital Computers
 VI MODEL DIGITAL COMPUTER *See* Digital Computers
 VACUUM TUBE *See* Electron Tube
 Van Buskirk, A. B. *illus* 315
 Van Uitert, L. G. *illus* 162, 274
 ferrite development 274
 VARISTOR
 silicon carbide
 test set
 semi-automatic 304-07
 Varner, Joyce *illus* 448
 Veazie, E. A. *illus* 76
Versatile Source of Millimeter Waves (C. F. Hempstead,
 A. R. Strnad) 241-45

VIDEO *See* Television
 Visscher, Maurice B. 120
 VOCODER 284-285
 VODER 286
Voice-Actuated Machines: Problems and Possibilities (E. E.
 David, Jr.) 281-86

W

W. R. G. BAKER AWARD *See* Baker Award
 Wagelein, Isabella *illus* 7
 Wagner, V. W. *illus* 299, 303
 biographical material 303
 *Improvements in Toll Connecting Circuits for National
 wide Dialing* 299-303
 Walker, J. G. 176
 WALL TENT. *See* Aerial Tent
 Warren, C. A. 115
 WARSHIP(s)
 air attack, defense against
 Gunnery System Simulator, transistorized 94-99
 WASHING
 semiconductor components 337
 WASHINGTON COLLEGE
 Baker, W. O., honorary degree 516
 WAVE
 millimeter
 oscillator
 backward-wave 241-45
 transmission 494-97
 rotation 293-97
 See also Microwave
 WAVE DELAY LINE *See* Delay Line
 WEAR, of metals 201
 Webber, C. A. *illus* 23
 Weight, E. F. *illus* 313
 Weinberg, S. B. *illus* 30
 Bell System Aid to the Blind 30-31
 Weisbaum, S. *illus* 460
 biographical material 460
 *Field Displacement Isolator in Microwave Communica-
 tions* 456-61
 Weiss, M. T. *illus* 316
 Wenk, H. A. 21
 Wenrich, J. R. *illus* 328
 Wentz, Edward C.
 Audio Engineering Society Award 453
 Wentz, J. F. 209
 West, Fred *illus* 15, 18
 biographical material 18
 Dial Testing Equipment 15-18
 West, J. M. 115
 WEST HAVEN, CONNECTICUT 42
 WEST PALM BEACH, FLORIDA 183
 WESTERN ELECTRIC COMPANY
 carbon black requirements 247-49
 Andre, F. J., director 156
 Columbus plant, projected 157
 DEW Line 18, 194-95
 nickel substitutes 162
 1956 activities 134
 Nike Hercules 147
 relays, production *graph* 227
 Rettaliata, J. T., director 156
 transatlantic telephone cable 46

transistors, diffused-base earth satellite 245
 "White Alice" 21
 WHIPPANY LABORATORY, radome 18
 WHISKER(s)
 metal
 plastic behavior 165
 study, atomic radiation 29
 White, P. R. 461
 "WHITE ALICE"
 Distant Early Warning Line reporting system 21
 WHITE PLAINS, NEW YORK 42
 Wier, Anthony J. *illus* 143, 145
 biographical material 145
 P1 Rural Carrier: Equipment Features 143-46
 Wilkes, D. P. 273
 Williams, H. J. 176-77
 Williams, J. C. 236
 Williams, J. L. 273
 Williams, Robert R. 196, 206
 Williford, O. H. *illus* 487
 biographical material 487
 Modern Crossbar PBX 485-87
 Willson, F. E. 21
 Wilson, J. R. 208
 Wilson, Murray A. 125
 Winbigler, H. S. *illus* 60
 biographical material 60
 Radio Transmission in Railroad Tunnels 57-60
 WIRE
 B-type, sections *illus* 248
 plastic insulated, capacitance monitor 308-11
 WIRE CENTER 139
 Wire-Spring Multicontact Relay (R. Stearns) 131-34
 WIRE-SPRING RELAY *See* Relay
 Wirén, Dag 116
 WIRING
 printed, *see* Printed Circuitry

Wolff, P. A. 197
 Wood, E. A. 177
 Wood, I. E. 209
 WOOD
 air 254
 bleeding 252-55
 liquid capacity 252
 moisture 254
 WOOD PRESERVATIVES
 oil-type, bleeding 252-55
 viscosity 253
 Woodward, Robert B. 52
 Wooley, M. C. 209; *illus* 76
 WORLD WAR II
 transatlantic telephony 43
 WRAPPED CONNECTION *See* Connection: solderless
 wrapped
 Wright, Orville 196
 WRIGHTSVILLE BEACH, NORTH CAROLINA 288-92

Y

Yamamoto, Sukeyasu 197
 Yager, W. A. *illus* 126, 129
 YALE UNIVERSITY
 Quarles, D. A., honorary degree 315
 YERBA BUENA ISLAND 135
 Young, W. R. *illus* 329
 Youry, W. S.
 New Gloves for Linemen 192

Z

Zacharias, J. R. 197
 ZINC
 Bell System consumption, 1956 161
 ZONE REFINING, floating-zone 342-43